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## **Mitsubishi Electric to Launch Contact Image Sensor in New KD-CXF Series**

*Achieves industry's deepest depth of field; ideal for inspecting surfaces of diverse objects in production*



KD6R1064CXF-NL model in new KD-CXF series

**TOKYO, November 30, 2022** – [Mitsubishi Electric Corporation](https://www.mitsubishielectric.com) (TOKYO: 6503) announced today that its new KD-CXF series of contact image sensors (CISs) equipped with the industry's deepest<sup>1</sup> depth of field<sup>2</sup> will launch this December beginning with the KD6R1064CXF-NL model. CISs are widely used in manufacturing to inspect product surfaces for scratches, dirt, miscoloring or mispositioning of printed labels, plastic film, etc. Mitsubishi Electric's CIS lineup comprises compactly designed models for space-saving installations that eliminate the need to change production line layouts at points where inspections are most required, thus significantly minimizing installation costs. Also, the image sensor, lens, etc. are built into the CIS unit, eliminating the need for complicated installations and optical adjustments, thereby minimizing maintenance and servicing costs.

Until now, the limitation of a shallow depth of field has made it difficult for CIS units to clearly focus on and accurately inspect objects that have significant surface irregularities or if they are subjected to strong vibration while moving down a production line. The company's existing CIS models are only used to inspect objects with flat surfaces, such as paper and film, and objects not subjected to vibration during inspection.

The KD6R1064CXF-NL model being launched in the new KD series combines an Erecting equal-magnification lens array (rod lens array)<sup>3</sup> with unique optical components to improve the depth of field to  $\pm 1.8\text{mm}$ , which is more than 3.6 times that of existing products.<sup>4</sup> Image reading is clear even if the object has significant surface irregularities or vibrates.

<sup>1</sup> As of November 30, 2022, according to Mitsubishi Electric's research into contact image sensor products

<sup>2</sup> Distance in which focus is maintained to read an image clear even when the object deviates from the focal point.

<sup>3</sup> Optical system in which a number of cylindrical lenses are arranged in parallel and the erecting equal-magnification images of each lens are superimposed to form one continuous image.

<sup>4</sup> Mitsubishi Electric's existing KD-AX, MX, CX, CXL and DXL series products

Manufacturing sites are facing increasing market demands for quality while also having to meet needs for labor-saving and automation due to rising labor costs and declining workforces in certain markets. Moreover, manufacturers are looking for ways to reduce the costs of installing, maintaining and servicing inspection equipment. Mitsubishi Electric’s new KD-CXF series of CISs will help to satisfy such demands.

**Product Features**

**1) Accurate image reading achieved with erecting equal-magnification lens array**

- An erecting equal-magnification lens array for the rod lenses has the same length as the reading width (1,064mm), ensuring accurate images without distortion on the edges.

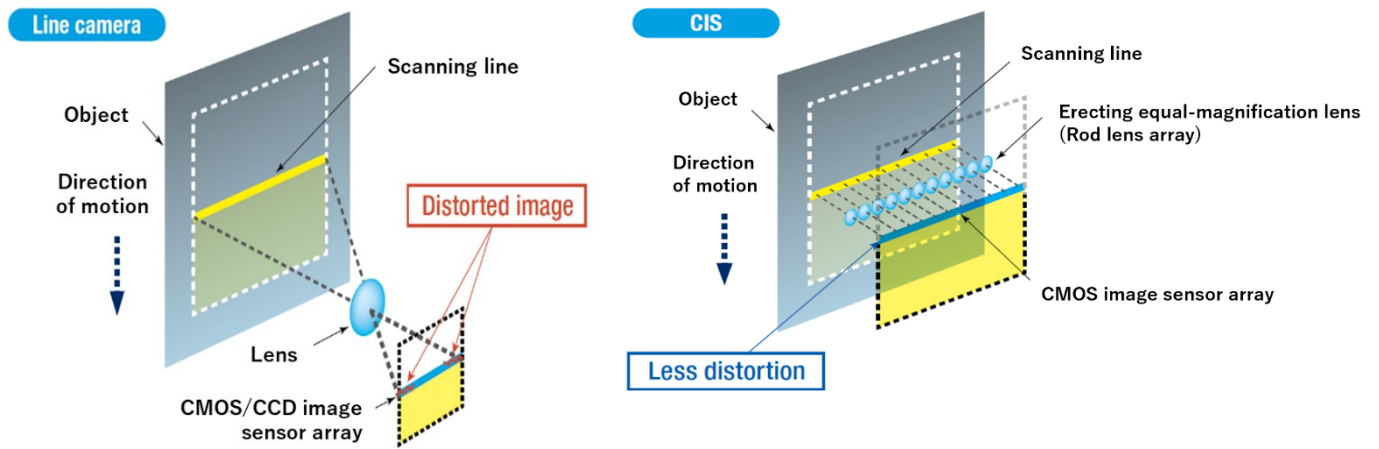


Fig. 1 Lens systems of Line camera and CIS

**2) Wide applicability thanks to industry's deepest depth of field**

- Mitsubishi Electric’s unique optical components contribute to an industry-leading depth of field of  $\pm 1.8\text{mm}$  (assuming 600dpi resolution).
- Can inspect objects even with significant surface irregularities or when vibrating.

|                               | Distance from focal point<br>(- side is closer to object and + side is further from object) |      |                                   |      |      |
|-------------------------------|---|------|-----------------------------------|------|------|
|                               | -2mm  | -1mm | $\pm 0\text{mm}$<br>(focal point) | +1mm | +2mm |
| Existing product <sup>5</sup> |   |      |                                   |      |      |
| KD-CXF series                 |   |      |                                   |      |      |

Note: The scanning line for reading above document is up and down, the direction of motion of CIS is from left to right.

Fig. 2 Images read at different focal points by existing product and new KD-CXF series model

<sup>5</sup> Mitsubishi Electric’s existing KD6R1064CXL-NL model in KD-CXL series

### 3) Integration of CMOS image sensor array and lens simplifies installations and adjustments

- The CMOS image sensor and lens are fixed inside CIS's housing, so complicated adjustment is not required.
- CIS and inspected objects can be read in close proximity, helping to save space on production lines.

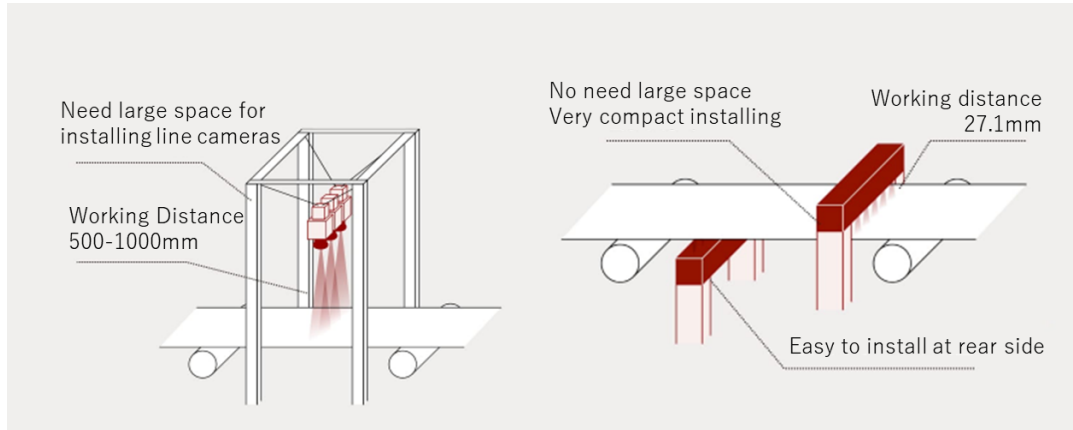


Fig. 3 Installation example of typical line camera vs. CIS (KD6R1064CXF-NL)

### Main Specifications of Typical Line Camera and New Model

|                               | Line camera  | CIS (KD6R1064CXF-NL)   |
|-------------------------------|--|------------------------|
| Resolution                    | Depends on position of camera and object           | Fixed (max. 600dpi)    |
| Distortion                    | Significant  | Uniform or minimized   |
| Working distance <sup>6</sup> | 500 to 1,000mm (adjustment by lens magnification)  | 27.1mm                 |
| System assembly               | Lenses and multicamera integration need adjustment | Simple (no adjustment) |
| Installation space            | Large (incl. working & optical path distances)     | Small                  |

Fig. 4 Specifications of line camera vs. CIS (KD6R1064CXF-NL)

### Product information

|                      |                            |
|----------------------|----------------------------|
| Model name           | KD6R1064CXF-NL             |
| Effective scan width | 1,064mm                    |
| Resolution           | 600dpi                     |
| Communication format | CoaXpress <sup>TM7</sup>   |
| Maximum line rate    | 55kHz/line <sup>8</sup>    |
| Depth of field       | ±1.8mm from focal point    |
| Illumination         | None required              |
| Dimensions (L×W×H)   | 1,131.1mm × 59mm × 119.3mm |
| RoHS <sup>9</sup>    | Compliant                  |
| CE mark              | Compliant                  |
| Sales launch         | December 2022              |

### Contributions to the Environment

This product complies with the RoHS.

<sup>6</sup> Distance from glass surface to object (CIS can get close to objects for inspection)

<sup>7</sup> Digital interface standard for transmitting images captured by CIS and cameras to frame grabber boards for image processing, etc. Trademark or registered trademark of Japan Industrial Imaging Association (JIIA)

<sup>8</sup> Transfer rate of 2.3m/sec in case of 600dpi resolution, 8-bit output and CXP-6 Quad connection

<sup>9</sup> Applicable RoHS exemptions are AnnexIII6(a), 6(c), 7(a), 7(c)-I, 15, and 34

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**About Mitsubishi Electric Corporation**

With more than 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Mitsubishi Electric enriches society with technology in the spirit of its “Changes for the Better.” The company recorded a revenue of 4,476.7 billion yen (U.S.\$ 36.7 billion\*) in the fiscal year ended March 31, 2022. For more information, please visit [www.MitsubishiElectric.com](http://www.MitsubishiElectric.com)

\*U.S. dollar amounts are translated from yen at the rate of ¥122=U.S.\$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2022